

CLAIMS

1. (Currently amended) A method of transferring image information from a scanning apparatus,[[,]] the method comprising:

providing a transfer signal to an image extraction device in the scanning apparatus, the image extraction device coupled to a computer;

transmitting data for each pixel of a scan line to the computer via a shift signal without storing the data in a memory buffer of the scanning apparatus;

adjusting a period of the shift signal based at least in part on a speed of reading the data by the computer, wherein data for all of the pixels of the scan line is transmitted during a period of the transfer signal.

2. (Previously presented) The method according to claim 1, further comprising adding a waiting time to the shift signal based at least in part on the period of the transfer signal.

3. (Previously presented) The method according to claim 1, wherein the period of the transfer signal comprises a constant period of time.

4. (Previously presented) The method according to claim 1, wherein the period of the transfer signal comprises a variable period of time.

5. (Previously presented) The method according to claim 1, wherein the transfer signal is enabled at a high level.

6. (Original) The method according to claim 1, wherein the shift signal is enabled at a high level.

7. (Previously presented) The method according to claim 1, wherein the image extraction device comprises a charge-coupled device.

8. (Canceled)

9. (Currently amended) A method of transferring image information from a scanning apparatus, the method comprising:

providing a transfer signal to an image extraction device in the scanning apparatus, wherein the scanning apparatus does not include a memory buffer;

transmitting pixel data for a scan line from the image extraction device to the computer via a shift signal, the shift signal having a cycle time; and

changing the cycle time of the shift signal from a first default cycle time to a second different cycle time if the computer processes the pixel data using an actual processing speed that is different than an expected processing speed, the expected processing speed associated with the first default cycle time.

~~performing at least one of: (a) decreasing a period of the shift signal if the computer uses a first processing speed to process the pixel data, or (b) increasing the period of the shift signal if the computer uses a second processing speed to process the pixel data, wherein the computer reads all of the pixel data of the scan line during a period of the transfer signal and wherein the first processing speed is greater than the second processing speed.~~

10. (Currently amended) The method according to claim 9, wherein the shift signal comprises a waiting time based at least in part on the cycle time ~~the period~~ of the transfer signal.

11. (Currently amended) The method according to claim 10 ~~[[9]]~~, wherein the cycle time ~~period~~ of the transfer signal comprises a constant period of time.

12. (Currently amended) The method according to claim 10 ~~[[9]]~~, wherein the cycle time ~~period~~ of the transfer signal comprises a variable period of time.

13. (Previously presented) The method according to claim 9, wherein the transfer signal is enabled at a high level.

14. (Currently amended) The method according to claim 9, wherein the image extraction device initiates said transmitting responsive to detecting a rising edge in the transfer signal ~~the shift signal is enabled at a high level.~~

15. (Previously Presented) The method according to claim 9, wherein the image extraction device comprises a charge-coupled device.

16. (Canceled)

17. (Currently amended) A method of transferring image information from a scanning apparatus, the method comprising:

providing a transfer signal to an image extraction device in the scanning apparatus, wherein the transfer signal defines an exposure time; and

transmitting a shift signal from the image extraction device to a processor during the exposure time without storing the shift signal in a memory buffer, wherein the shift signal comprises pixel data for each pixel in a scan line[.];

wherein the period of the shift signal is variable and responsive to a reading speed of the computer.

18. (Previously Presented) The method of claim 17, wherein the shift signal comprises one or more reading times and one or more waiting times.

19. (Previously Presented) The method of claim 18, wherein a duration of the one or more waiting times is determined by a reading speed of the computer.

20. (Currently amended) The method of claim 17, wherein each period of the shift signal initiates transfer of ~~comprises~~ data for a single pixel of the scan line ~~and wherein the period of the shift signal is variable and responsive to a reading speed of the computer.~~

21. (Previously Presented) The method of claim 17, wherein the exposure time is variable.

22. (Previously Presented) The method of claim 17, wherein the exposure time is defined by the transfer signal such that the exposure time begins when the transfer signal goes high.

23. (Previously Presented) An apparatus, comprising:
a scanning device including an image extraction device,
wherein the scanning device is configured to transmit data for each pixel of a scan line to a computer via a shift signal without storing the data in a memory buffer of the scanning device, wherein the scanning device is configured to adjust a period of the shift signal based at least in part on a speed of reading the data by the computer, and wherein data for all of the pixels of the scan line is transmitted during a period of the transfer signal.

24. (Previously Presented) The apparatus of claim 23, wherein the scanning device is further configured to add a waiting time to the shift signal based at least in part on the period of the transfer signal.

25. (Previously Presented) The apparatus of claim 23, wherein the period of the transfer signal comprises a constant period of time.

26. (Previously Presented) The apparatus of claim 23, wherein the period of the transfer signal comprises a variable period of time.

27. (Previously Presented) The apparatus of claim 23, wherein the image extraction device comprises a charge-coupled device.

28. (Previously Presented) The apparatus of claim 23, wherein adjusting a period of the shift signal comprises at least one of:

(a) decreasing a period of the shift signal if the computer uses a first processing speed to process the pixel data; or

(b) increasing the period of the shift signal if the computer uses a second processing speed to process the pixel data, wherein the first processing speed is greater than the second processing speed.

29. (Currently amended) An apparatus, comprising:

~~a scanning means including~~ an image extraction means for providing scan line data [[.]]:

a timing signal output means for outputting a shift signal, the shift signal to control when the image extraction means initiates transferring portions of the scan line data from the apparatus to an external device; and

a feedback means for detecting a rate that the external device processes the transferred scan line data and feeding back said detected rate to the timing signal output means;

wherein the timing signal output means is configured to vary a period of the shift signal if the processing rate does not correspond with a transfer time for the scan line data.

~~wherein the scanning means is configured to transmit data for each pixel of a scan line to a processing means via a shift signal without storing the data in a memory buffer of the scanning means, wherein the scanning means is configured to adjust a period of the shift signal based at least in part on a speed of reading the data by the processing means, and wherein data for all of the pixels of the scan line is transmitted during a period of the transfer signal.~~

30. (Currently amended) The apparatus of claim 29, wherein the timing signal output means ~~the scanning means~~ is further configured to add a waiting time to the shift signal based at least in part on a period of a transfer signal that controls the transfer time for the scan line data ~~the period of the transfer signal~~.

31. (Currently amended) The apparatus of claim 30 ~~[[29]]~~, wherein the period of the transfer signal comprises a constant period of time.

32. (Currently amended) The apparatus of claim 30 ~~[[29]]~~, wherein the period of the transfer signal comprises a variable period of time.

33. (Previously Presented) The apparatus of claim 29, wherein the image extraction means comprises a charge-coupled device.

34. (Currently amended) The apparatus of claim 29 wherein the timing signal output means is configured to increase the period of the variable shift signal response to detecting a processing rate of the external device that is less than an expected rate.

~~The apparatus of claim 29, wherein adjusting a period of the shift signal comprises at least one of:~~

~~(a) — decreasing a period of the shift signal if the processing means uses a first processing speed to process the pixel data; and~~

~~(b) — increasing the period of the shift signal if the processing means uses a second processing speed to process the pixel data, wherein the first processing speed is greater than the second processing speed.~~

35. (New) A scanner, comprising:
a light source to illuminate a document supported by a document platform;
an image extraction device to provide scan line data according to an exposure time; and
signal output circuitry to control transfer of the scan line data from the scanner to an external device, the signal output circuitry operable to:

generate a signal having a cycle time, the cycle time of the signal controlling the frequency that the scanner initiates transfer of a portion of the scan line data from the scanner to the external device; and

vary the cycle time according to a rate that the external device processes the transferred scan line data.

36. (New) The apparatus of claim 35 wherein the cycle time is increased when the processing rate does not reach a threshold rate needed to complete transfer of the scan line data during the exposure time.

37. (New) The apparatus of claim 35 wherein the signal output circuitry is further operable to:

trigger the image extraction device to provide new scan line data at the end of the exposure time; and

delay triggering the image extraction device if the cycle time is increased beyond a threshold cycle time.

38. (New) The apparatus of claim 35 wherein the signal comprises a repeating waveform and the cycle time is an amount of time to output one instance of the repeating waveform.

39. (New) The apparatus of claim 35 wherein the signal output circuitry is operable to vary the cycle time by either increasing or decreasing the amount of time between rising or falling edges in the signal.

40. (New) The apparatus of claim 35 wherein each transferred portion of the scan line data represents a pixel.